



Vincotech

B0-EP12NAA004MS-PS38F78T

target datasheet

flowANPC E3 SiC

1200 V / 4,25 mΩ

Topology features

- Advanced Neutral Point Clamped topology
- IGBT
- Kelvin Emitter for improved switching performance
- MOSFET
- Temperature sensor

Component features

- High Blocking Voltage with low drain source on state resistance
- High speed SiC-MOSFET technology
- Resistant to Latch-up

Housing features

- Base isolation: Al₂O₃
- CTI600 housing material
- Compact, baseplate-less housing
- VINcoPress Technology
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

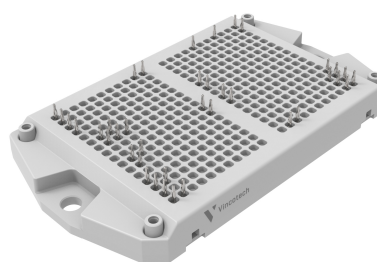
Target applications

- Energy Storage Systems
- Solar Inverters

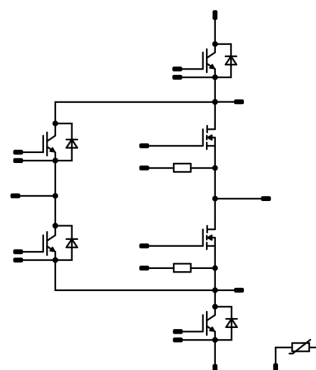
Types

- B0-EP12NAA004MS-PS38F78T

flow E3 12 mm housing



Schematic





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Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
AC Switch				
Drain-source voltage	V_{DS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	427	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	1136	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	272	W
Gate-source voltage	V_{GS}	static	-5 / 18	V
		dynamic	-10 / 22	V
Maximum Junction Temperature	T_{jmax}		175	°C

Neutral Point Switch

Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	97	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	175	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	9,5	µs
Maximum junction temperature	T_{jmax}		175	°C

DC-Link Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	131	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	217	W
Maximum junction temperature	T_{jmax}		175	°C



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Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
DC-Link Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	172	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	289	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	9,5	μs
Maximum junction temperature	T_{jmax}		175	°C

Neutral Point Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	75	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	132	W
Maximum junction temperature	T_{jmax}		175	°C

Resistor (Sense)

DC current	I	terminal temperature $T_k = 90\text{ °C}$	1264	mA
Power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	0,4	W
Operation Temperature	T_{op}		-55 ... 155	°C



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Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
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Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40...+125	°C
Operation temperature under switching condition	T_{jop}		-40...+(T_{jmax} - 25)	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage $t_p = 2\text{ s}$	6800	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		≥ 600	



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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	

AC Switch

Static

Drain-source on-state resistance	$r_{DS(on)}$		18		284	25		4,25	6,25	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,0284	25	1,7	2,25	2,75	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			400	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			40	μA
Internal gate resistance	r_g							0,25		Ω
Gate charge	Q_g		-5/18	800	284	25		752		nC
Short-circuit input capacitance	C_{iss}	$f = 500$ kHz	0	800	0	25		18720		pF
Short-circuit output capacitance	C_{oss}							940		
Reverse transfer capacitance	C_{rss}							32		
Diode forward voltage	V_{SD}		0		284	25		4,1		V

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,35		K/W
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Characteristic Values

Parameter	Symbol	Conditions						Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max		

Neutral Point Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,01	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		100	25 150		1,55 1,8	1,85	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			100	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	0	10		25			21000		pF
Output capacitance	C_{oes}							700		pF
Reverse transfer capacitance	C_{res}							280		pF
Gate charge	Q_g	$V_{CC} = 600$ V	0/15		100	25		700		nC

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,54		K/W
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DC-Link Diode

Static

Forward voltage	V_F				200	25 125 150		1,65 1,65 1,65	2,1	V
Reverse leakage current	I_R	$V_r = 1200$ V				25			80	µA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,44		K/W
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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	

DC-Link Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,02	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 150		1,55 1,8	1,85	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			200	µA
Gate-emitter leakage current	I_{GES}		20	0		25			400	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	0	10		25			42000		pF
Output capacitance	C_{oes}							1400		pF
Reverse transfer capacitance	C_{res}							560		pF
Gate charge	Q_g	$V_{CC} = 600$ V	0/15		200	25		1400		nC

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,33		K/W
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Neutral Point Diode

Static

Forward voltage	V_F				100	25 125 150		1,65 1,65 1,65	2,1	V
Reverse leakage current	I_R	$V_r = 1200$ V				25			40	µA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,72		K/W
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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	

Resistor (Sense)

Static

Resistance	R							0,25		Ω
Tolerance							-1		1	%
Temperature coefficient	tc							200		ppm/K

Thermistor

Static

Rated resistance	R					25		5		k Ω
Deviation of R100	$A_{R/R}$	$R_{100} = 499 \Omega$				100	3,2		3,3	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,3		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$						3380		K
Vincotech Thermistor Reference									V	



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Ordering Code	
Version	Ordering Code
Without thermal paste	B0-EP12NAA004MS-PS38F78T
With thermal paste (5,2 W/mK, PTM6000HV)	B0-EP12NAA004MS-PS38F78T-/7/

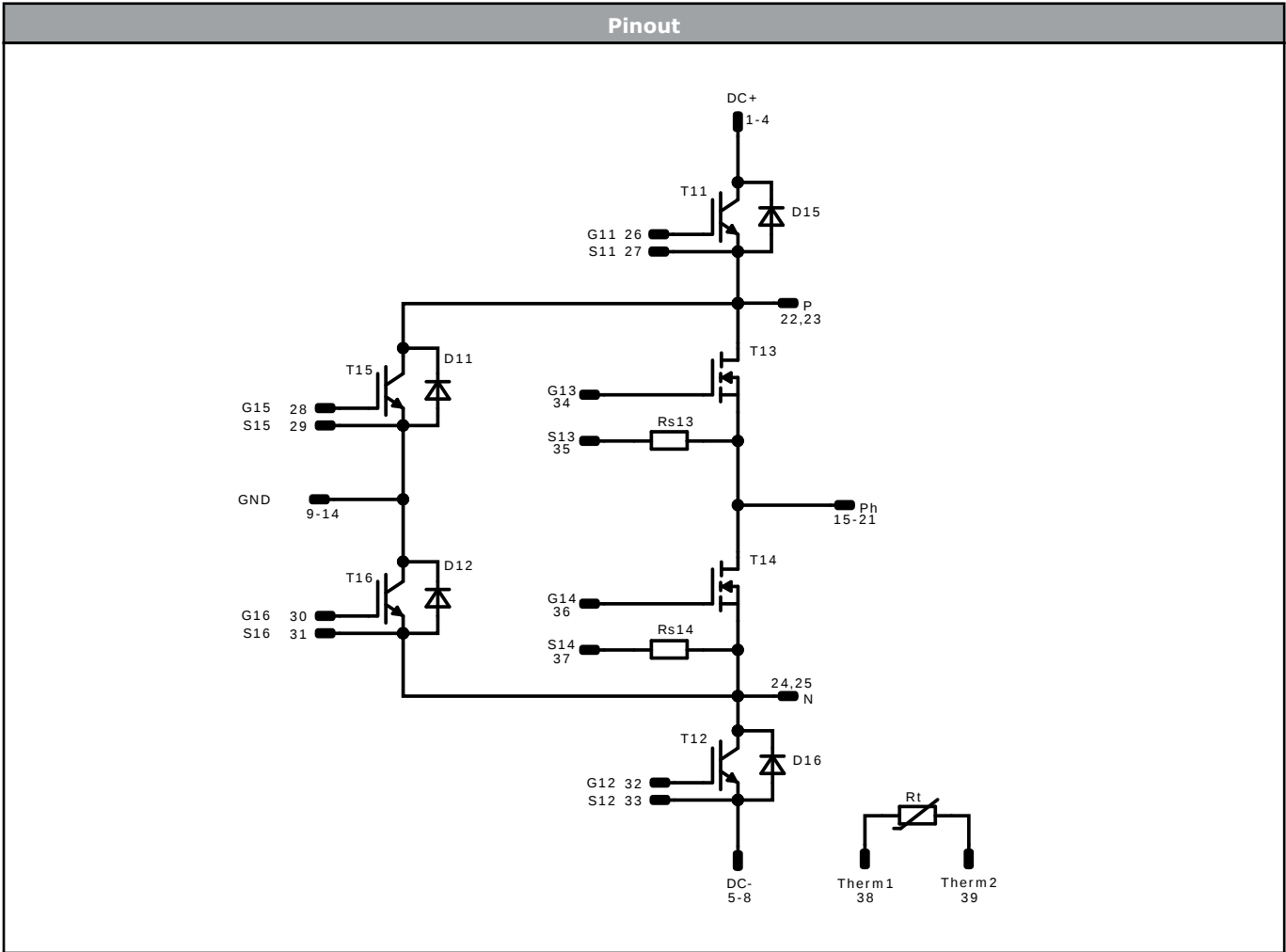
Marking						
	Text	Name NN-NNNNNNNNNNNNNN- TTTTTVV	Date code WWYY	UL & VIN UL VIN	Lot LLLLL	Serial SSSS
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Outline																																																																																																																																																																			
Pin table [mm] <table><thead><tr><th>Pin</th><th>X</th><th>Y</th><th>Function</th></tr></thead><tbody><tr><td>1</td><td>0</td><td>48</td><td>DC+</td></tr><tr><td>2</td><td>0</td><td>44,8</td><td>DC+</td></tr><tr><td>3</td><td>0</td><td>41,6</td><td>DC+</td></tr><tr><td>4</td><td>0</td><td>38,4</td><td>DC+</td></tr><tr><td>5</td><td>0</td><td>9,6</td><td>DC-</td></tr><tr><td>6</td><td>0</td><td>6,4</td><td>DC-</td></tr><tr><td>7</td><td>0</td><td>3,2</td><td>DC-</td></tr><tr><td>8</td><td>0</td><td>0</td><td>DC-</td></tr><tr><td>9</td><td>3,2</td><td>32</td><td>GND</td></tr><tr><td>10</td><td>3,2</td><td>28,8</td><td>GND</td></tr><tr><td>11</td><td>6,4</td><td>32</td><td>GND</td></tr><tr><td>12</td><td>3,2</td><td>19,2</td><td>GND</td></tr><tr><td>13</td><td>3,2</td><td>16</td><td>GND</td></tr><tr><td>14</td><td>6,4</td><td>19,2</td><td>GND</td></tr><tr><td>15</td><td>72,16</td><td>9,6</td><td>Ph</td></tr><tr><td>16</td><td>72,16</td><td>6,4</td><td>Ph</td></tr><tr><td>17</td><td>72,16</td><td>3,2</td><td>Ph</td></tr><tr><td>18</td><td>72,16</td><td>0</td><td>Ph</td></tr><tr><td>19</td><td>68,96</td><td>6,4</td><td>Ph</td></tr><tr><td>20</td><td>68,96</td><td>3,2</td><td>Ph</td></tr><tr><td>21</td><td>68,96</td><td>0</td><td>Ph</td></tr><tr><td>22</td><td>40,16</td><td>32</td><td>P</td></tr><tr><td>23</td><td>40,16</td><td>28,8</td><td>P</td></tr><tr><td>24</td><td>40,16</td><td>22,4</td><td>N</td></tr><tr><td>25</td><td>40,16</td><td>19,2</td><td>N</td></tr><tr><td>26</td><td>28,8</td><td>48</td><td>G11</td></tr><tr><td>27</td><td>32</td><td>48</td><td>S11</td></tr><tr><td>28</td><td>9,6</td><td>28,8</td><td>G15</td></tr><tr><td>29</td><td>6,4</td><td>28,8</td><td>S15</td></tr><tr><td>30</td><td>32</td><td>22,4</td><td>G16</td></tr><tr><td>31</td><td>32</td><td>19,2</td><td>S16</td></tr><tr><td>32</td><td>3,2</td><td>6,4</td><td>G12</td></tr><tr><td>33</td><td>3,2</td><td>0</td><td>S12</td></tr><tr><td>34</td><td>72,16</td><td>44,8</td><td>G13</td></tr><tr><td>35</td><td>72,16</td><td>48</td><td>S13</td></tr><tr><td>36</td><td>46,56</td><td>0</td><td>G14</td></tr><tr><td>37</td><td>43,36</td><td>0</td><td>S14</td></tr><tr><td>38</td><td>52,96</td><td>48</td><td>Therm1</td></tr><tr><td>39</td><td>62,56</td><td>48</td><td>Therm2</td></tr></tbody></table>				Pin	X	Y	Function	1	0	48	DC+	2	0	44,8	DC+	3	0	41,6	DC+	4	0	38,4	DC+	5	0	9,6	DC-	6	0	6,4	DC-	7	0	3,2	DC-	8	0	0	DC-	9	3,2	32	GND	10	3,2	28,8	GND	11	6,4	32	GND	12	3,2	19,2	GND	13	3,2	16	GND	14	6,4	19,2	GND	15	72,16	9,6	Ph	16	72,16	6,4	Ph	17	72,16	3,2	Ph	18	72,16	0	Ph	19	68,96	6,4	Ph	20	68,96	3,2	Ph	21	68,96	0	Ph	22	40,16	32	P	23	40,16	28,8	P	24	40,16	22,4	N	25	40,16	19,2	N	26	28,8	48	G11	27	32	48	S11	28	9,6	28,8	G15	29	6,4	28,8	S15	30	32	22,4	G16	31	32	19,2	S16	32	3,2	6,4	G12	33	3,2	0	S12	34	72,16	44,8	G13	35	72,16	48	S13	36	46,56	0	G14	37	43,36	0	S14	38	52,96	48	Therm1	39	62,56	48	Therm2
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Identification					
ID	Component	Voltage	Current	Function	Comment
T13, T14	MOSFET	1200 V	4,25 mΩ	AC Switch	
T15, T16	IGBT	1200 V	100 A	Neutral Point Switch	
D15, D16	FWD	1200 V	200 A	DC-Link Diode	
T11, T12	IGBT	1200 V	200 A	DC-Link Switch	
D11, D12	FWD	1200 V	100 A	Neutral Point Diode	
Rs13, Rs14	Resistor			Resistor (Sense)	
Rt	Thermistor			Thermistor	



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Packaging instruction				
Standard packaging quantity (SPQ) 40	>SPQ	Standard	<SPQ	Sample
Handling instruction				
Handling instructions for <i>flow</i> E3 packages see vincotech.com website.				
Package data				
Package data for <i>flow</i> E3 packages see vincotech.com website.				
Vincotech thermistor reference				
See Vincotech thermistor reference table at vincotech.com website.				
UL recognition and file number				
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}=150^{\circ}\text{C}$ and up to 4000VAC/1min isolation voltage. For more information see vincotech.com website.				

Document No.:	Date:	Modification:	Pages
B0-EP12NAA004MS-PS38F78T-T1-14	11 Jul. 2025	Initial Release	

Product status definition		
Datasheet Status	Product Status	Definition
Target	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. The data contained is exclusively intended for technically trained staff.

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.